What is claimed is:

1. A dimensionally stable polymer balloon having a longitudinal axis and composed of a micro-composite material, the micro-composite material comprising a polymer matrix component and a polymer fibril component distributed in the polymer matrix component, the fibril component having micro-fibers oriented substantially parallel or diagonally to the longitudinal axis of the balloon.

2. The dimensionally stable polymer balloon of claim 1 mounted on a catheter.

3. The dimensionally stable polymer balloon of claim 1, wherein said micro-composite material comprises about 0.1 wt-% to about 20 wt-% of said fibril component.

4. The dimensionally stable polymer balloon of claim 1, wherein said micro-composite material comprises about 0.5 wt-% to about 8 wt-% of said fibril component.

5. The dimensionally stable polymer balloon of claim 1, wherein said micro-composite material comprises about 0.5 wt-% to about 15 wt-% of said fibril component.

6. The dimensionally stable balloon of claim 1, wherein said micro-composite material comprises about 50 wt-% to about 99.9 wt-% of said polymer matrix component.

7. The dimensionally stable balloon of claim 1, wherein said micro-composite material comprises about 85 wt-% to about 99.5 wt-% of said polymer matrix component.

8. The dimensionally stable balloon of claim 1, wherein the micro-composite material further comprises a compatibilizer component.

9. The dimensionally stable balloon of claim 8 wherein said compatibilizer is a block copolymer.

10. The dimensionally stable balloon of Claim 8 wherein said compatibilizer is selected from the group consisting of copolyester elastomers, ethylene unsaturated ester copolymers, copolymers of ethylene and a carboxylic acid or derivative thereof, polyolefins or ethylene-unsaturated ester copolymers grafted with functional monomers, copolymers of ethylene and a carboxylic acid or derivative thereof, terpolymers of ethylene, copolymers of unsaturated esters and carboxylic acids or derivatives thereof, maleic acid grafted styrene/ethylene-butadiene-styrene block copolymers, acrylic

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elastomers, glycidyl(meth)acrylates, ionomeric copolymers, polyester-polyether block copolymers, and mixtures thereof.

11. The dimensionally stable polymer balloon of claim 1, wherein said compatibilizer is selected from the group consisting of ethylene-maleic anhydride copolymers, ethylene-methyl acrylate copolymers, ethylene-methyl acrylate-maleic anhydride terpolymers, ethylene- methyl acrylate-methacrylic acid terpolymers, alkyl(meth)acrylate-ethylene-glycidyl(meth)acrylate terpolymers, and mixtures thereof.

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12. The dimensionally stable balloon of claim 1, wherein the fibril component is composed of rigid-rod thermoplastic material.

13. The dimensionally stable balloon of claim 1, wherein the fibril component is composed of semi-rigid-rod thermoplastic material.

14. The dimensionally stable balloon of claim 1, wherein the fibril component is composed of liquid crystal polymer material.

15. The dimensionally stable balloon of claim 1, wherein the fibril component has a melting point of about 275° C or less.

16. The dimensionally stable balloon of claim 1, wherein the fibril component has a melting point of about 250° C or less.

17. The dimensionally stable balloon of claim 1, wherein the fibril component has a melting point of about 150° to about 249° C.

18. The dimensionally stable balloon of claim 1, wherein the fibril component has a melting point of about 230° C or less.

19. The dimensionally stable balloon of claim 1, wherein the matrix component comprises a semi-compliant thermoplastic polymer.

20. The dimensionally stable balloon of claim 1, wherein the matrix component has a melting point of about 140° C to about 265° C.

21. The dimensionally stable polymer balloon of claim 1, wherein the matrix component comprises a polyamide-polyester block copolymer, a polyamide/polyether/polyester block copolymer, a polyester-polyether block copolymer, or a mixture thereof.

22. The dimensionally stable polymer balloon of claim 1, wherein the matrix component has a melting point of about 150° C to about 230° C.

23. The dimensionally stable polymer balloon of claim 1, wherein the matrix component has a melting point of about 220° or less.

24. The dimensionally stable balloon of claim 1, wherein the micro-fibers are oriented substantially parallel to the longitudinal axis of the balloon.

25. The dimensionally stable balloon of claim 1, wherein the micro-fibers are oriented diagonally to the longitudinal axis of the balloon.

26. The dimensionally stable balloon of claim 1, wherein the orientation of the micro-fibers relative to the longitudinal axis of the balloon changes through the balloon material in a direction transverse to said longitudinal axis.

27. A method of forming a balloon composed of a micro-composite material comprising the steps of:

(a) melt blending a matrix component and a fibril component, wherein the mixture comprises less than about 15 percent by weight but greater than about 0.5 percent by weight of said fibril component, and the matrix component comprises less than about 99.5 percent by weight but greater than about 85 percent by weight of said matrix component;

(b) forming the melt blended mixture into tubing by extrusion in a manner which orients the fibril component along the longitudinal axis of the tubing; and

(c) forming the balloon by radial expansion of a segment of the tubing.

28. The method of claim 27 further comprising adding a compatibilizer to the melt blended mixture.

29. A method of forming a balloon composed of a micro-composite material comprising the steps of:

a) melt blending a matrix component and a fibril component, wherein the mixture comprises less than about 15 percent by weight but greater than about 0.5% by weight of said fibril component, and the matrix component comprises less than about 99.5% by weight but greater than about 85 percent by weight of said matrix component;

b) forming the melt blended mixture into a tubular form by extrusion;

c) collecting the extruded tube on a puller; wherein the extrudate puller is pulling the tube at a higher speed than the tube is being extruded; and

d) affixing the tubular form onto a catheter.

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30. The method of forming a balloon composed of a micro-composite material of claim 29 further comprising the step of adding a compatibilizer to the mixture.

31. An inflatable medical balloon having a determined pre-inflation length, restricted longitudinal or radial expansion characteristics, a circumference and a longitudinal axis comprising:

a matrix material, said matrix material characterized as being semi-compliant;

and having a plurality of cores therethrough, said cores being evenly distributed about the circumference of the balloon and being composed of one or more materials which are characterized as being stronger than the matrix material and having a bulk elongation less than the matrix material when the one or more materials are oriented in the direction of the longitudinal axis, and the matrix material and the core material operatively adhering to one another.

32. The medical balloon of claim 31, wherein the bulk elongation of the one or more cores material is between 50% and 150%.

33. The medical balloon of claim 31, wherein the balloon longitudinally expands less than 5% beyond the pre-inflation state.

34. The medical balloon of claim 31, wherein the fibril component is between about 0.1 micron to about 1 micron in diameter.

35. The medical balloon of claim 31, wherein the matrix component is between about 10 microns and about 12 microns in diameter.

36. The medical balloon of claim 31, wherein the balloon has a multilayer structure.

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